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AUTHORITY

darpa ltr, 9 dec 1977

การทดสอบรถจักรยานยนต์สองล้อ
ระยะที่สอง
STAGE II MOTORBIKE TEST

69 - 011

ศูนย์วิจัยและพัฒนาการทหาร
ระหว่าง ไทย – สหรัฐ
JOINT THAI - U.S.
MILITARY RESEARCH AND DEVELOPMENT CENTER
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BANGKOK, THAILAND

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การทดสอบรถจักรยานยนต์ล้อระยะที่สอง

STAGE II MOTORBIKE TEST

by

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69-011

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April 1969

ศูนย์วิจัยและพัฒนาการทหาร
ระหว่าง ไทย - สหรัฐฯ

Joint Thai - U.S.
Military Research and Development Center

ประเทศไทย

Bangkok, Thailand

บทย่อ

เอกสารฉบับนี้เป็นรายงานการทดสอบรถจักรยานยนต์ล้อระยะที่สอง ซึ่งดำเนินการทดสอบประเมินค่าโดยผู้ใช้ เพื่อศึกษาพิจารณาในการที่จะเลือกหาจักรยานยนต์ล้อที่เหมาะสมให้ ภชด.นำไปใช้ โครงการนี้เป็นโครงการร่วมระหว่างศูนย์วิจัยและพัฒนาการทหาร - องค์การโครงการวิจัยขั้นสูงกระทรวงกลาโหมสหรัฐและ ภชด. โดย ภชด.เป็นหน่วยทดสอบ รายงานฉบับนี้ได้กล่าวถึง ภูมิหลัง สภาพแวดล้อมของพื้นที่ทดสอบ แผนการทดสอบและอธิบายถึงการประเมินค่าโดยผู้ใช้ รวมทั้งผลที่ได้รับ ส่วนรายงานเกี่ยวกับคุณลักษณะของรถจักรยานยนต์ ข้อมูลการทดสอบระดับเสียงที่เกิดขึ้นเมื่อใช้ปฏิบัติการ การซ่อมบำรุงและข้อมูลการส่งกำลังบำรุงนั้นแยกอยู่ในภาคผนวกของรายงานฉบับนี้ ผลที่ได้ปรากฏว่า รถจักรยานยนต์ฮอนด้า ซีที - 90 เป็นแบบที่เหมาะสมที่สุด ที่จะนำไปให้ ภชด.ใช้เพื่อเพิ่มการระวังป้องกันพื้นที่ที่อยู่ในชนบท.

ABSTRACT

This document reports the MRDC/ARPA and Border Patrol Police efforts in the Stage II motorbike user evaluation test to determine the appropriate two-wheeled vehicle for use by the latter organization. It presents the background, environment, and test plan, and describes the user evaluation and results therefrom. Motorbike characteristics, noise level test data, and maintenance and logistics data are contained in appendixes to the report. The Honda CT-90 motorbike was found to be acceptable for use by the Border Patrol Police to increase its rural security efforts.

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Mr. Boonchoo Wongratana MRDC	Mechanic

บทสรุป

ปัญหา

ปัญหามีอยู่ว่าจะเป็นไปได้หรือไม่ที่จะเพิ่มประสิทธิภาพ การปฏิบัติการของ ภชด.ในด้านการระวังป้องกันพื้นที่ชนบท โดยจัดให้ ภชด.มีรถจักรยานยนต์ไว้ใช้

วิธีการดำเนินงาน

ภชด. 1 หมวด ที่ประจำอยู่ในภาคใต้ของประเทศไทย ได้รับมอบรถจักรยานยนต์เทรลเบรคเกอร์ จำนวน 5 คัน และรถจักรยานยนต์ ฮอนด้า แบบ ซีที - 90 จำนวน 20 คันเพื่อใช้ปฏิบัติภารกิจตามปกติ เป็นระยะเวลา 6 เดือน ในการทดสอบนี้ได้ใช้วิธี "ประเมินค่าโดยผู้ใช้" เป็นเทคนิคในการหาข้อมูลที่จะนำไปใช้วิเคราะห์ตามความมุ่งหมายของการทดสอบรถจักรยานยนต์ในระยะที่สองนี้

ข้อสรุป

รถจักรยานยนต์ เทรลเบรคเกอร์ จัดเป็นยุทโธปกรณ์พิเศษซึ่งไม่มีประโยชน์มากในการใช้ปฏิบัติการตามปกติของ ภชด.

รถจักรยานยนต์ ฮอนด้า ซีที - 90 ช่วยเพิ่มความคล่องตัว และความสามารถในการปฏิบัติการตอบโต้โดยฉับพลันของ ภชด.

รถจักรยานยนต์เหล่านี้ช่วยในการหาข่าวในเขตพื้นที่ที่รับผิดชอบของ ภชด.เพิ่มขึ้นอีกทั้งยังช่วยในด้านการวางกำลังในพื้นที่ การระวังป้องกันในเขตรับผิดชอบของ ภชด. โดยตลอด

วิธีใช้รถจักรยานยนต์ที่ดีที่สุดนั้น ใช้เพื่อเพิ่มเติมสนับสนุนให้แก่การลาดตระเวนด้วยเท้า ดีกว่าการนำไปใช้แทนการลาดตระเวนด้วยเท้า

เนื่องจากรถจักรยานยนต์มีเสียงดัง และมีขีดจำกัดการใช้ทั้งบนถนนและเส้นทางในป่าซึ่งมักจะถูกโจมตีง่าย จึงควรจะมีการพัฒนาหลักนิยมในการใช้รถจักรยานยนต์ขึ้นเพื่อใช้ในการปฏิบัติการระวังป้องกันพื้นที่ของตำรวจและหน่วยกึ่งทหาร

SUMMARY

PROBLEM

The problem was to predict whether or not the effectiveness of the police role in rural security can be increased by equipping the police units with motorbikes.

METHODOLOGY

A designated Border Patrol Police (BPP) platoon in South Thailand was supplied with five Trailbreaker and twenty Honda CT-90 motorbikes for use during normal police operations for a six-month period. A "user evaluation" was the technique employed to obtain data to support an analysis for responding to the objectives of the Stage II Motorbike Test.

CONCLUSIONS

The Honda CT-90 motorbikes provide the BPP with increased mobility, and a quick reaction capability.

Motorbikes assist the BPP in increasing the numbers of intelligence contacts in it's area of responsibility, and provide a means for increasing and intensifying security deployment throughout the BPP's area of responsibility.

Motorbikes can best be used to augment rather than replace foot patrol operations.

Motorbikes, owing to their noise signature and being generally road- or trail-bound, are vulnerable to ambush; doctrine, especially in the area of motorbike security, needs to be developed for use in police or para-military operations.

Motorbikes are less useful than foot patrols in the reconnaissance role, as the operator must concentrate his attention on operating the vehicle rather than on observing what may be happening along the route of the patrol.

บทบาทในการลาดตระเวนนั้น การใช้รถจักรยานยนต์ลาดตระเวนมีประโยชน์น้อยกว่าการลาดตระเวนด้วยเท้า เพราะว่าผู้ขับขี่จะต้องใช้ความระมัดระวังในการขับขี่มากกว่าที่จะใช้ความสังเกตว่าจะมีอะไรเกิดขึ้นตามเส้นทางที่ลาดตระเวนไป

ข้อเสนอแนะ

รถจักรยานยนต์ ฮอนด้า ซีที - 90 ที่ได้ปรับปรุงแก้ไขให้เหมาะสมแล้ว ควรจะจัดเป็นยานสองล้อเพื่อใช้ในการปฏิบัติงานของ ภปด. โดยจัดให้มี 1 หมวดรถจักรยานยนต์ต่อ 1 กองร้อย

ควรมีการวางหลักการดัดแปลงแก้ไขตามที่เสนอไว้ในอนุผนวก ค.ของรายงานฉบับนี้ ก่อนที่จะจัดหารถจักรยานยนต์ดังกล่าวมาใช้เป็นจำนวนมาก ๆ

ควรนำรถจักรยานยนต์ไปใช้เพื่อเพิ่มเติมสนับสนุนมากกว่า การนำไปใช้แทนการลาดตระเวนด้วยเท้า

ถ้า ภปด.จะจัดหารถจักรยานยนต์เป็นจำนวนมาก ๆ ควรจะมีการจัดทำคู่มือการฝึกและคู่มือหลักนิยมการใช้งานขึ้น.

The Trailbreaker motorcycles are regarded as specialized equipment with minimal value in regular BPP operations.

RECOMMENDATIONS

The Honda CT-90 motorbike, with suitable modifications, should be adopted as the two-wheeled vehicle best suited for BPP operations, with one platoon per company being so equipped.

The motorbike modifications proposed in Appendix C, should be adopted prior to quantity procurement of the vehicles.

The motorbikes should be used to augment rather than replace BPP foot patrol operations.

A training manual and an operation doctrine manual should be developed and published if the BPP are to be equipped with a sizeable number of motorbikes.

DISCUSSION

BACKGROUND

For a considerable time there has been a requirement for a lightweight two-wheeled vehicle for use on the trails in southern Thailand, particularly by the Border Patrol Police (BPP). Since 1963, a number of vehicles, including the Tote Gote, the BSA 40, the Velo Solex, and the Trailbreaker have been tested for this purpose; for a variety of reasons they have been rejected as the primary mode of transportation for the missions envisioned or assigned to the Border Patrol Police (BPP) in southern Thailand. The Stage I Motorbike Test noted the shortcomings of the above-listed vehicles, and as a result it was decided to widen the investigation for a suitable vehicle.

The primary candidate vehicle selected for the Stage II user evaluation test was the Honda CT-90 Mountain Type Motorbike (Figure 1). In order to provide adequate transportation for a platoon-size unit, a total of 20 Honda motorbikes were purchased by ARPA RDC-T. For purposes of comparison, a second candidate vehicle, the Trailbreaker Motorbike (Figure 2), was included in the Stage II user evaluation test; the choice of this particular vehicle was a result of the USOM Public Safety Division's continued interest in a motorcycle with rough-trail and cross-country capabilities, and the promise shown by this vehicle in the Stage I test. (See Appendix A, for detailed descriptions of the candidate vehicles.)

The tests reported in this document constituted the second stage of motorcycle tests conducted by the Mobility Division of the Joint Thai-U.S. Military Research and Development Center (MRDC), as a part of ARPA-AGILE Project 23.40, Trail and Cross-Country Mobility. Stage I was a mobility evaluation of candidate vehicles; Stage II is an operational evaluation of the vehicle by the user organization (BPP).

ENVIRONMENT

The terrain and weather environment in the operation area of the Sadao BPP Company (Changwat Songkhla, Amphoe Sadao), where the Stage II Motorbike Test was conducted, does favor motorbike use. Even during the rainy seasons the maneuverability of the motorbikes gives them an

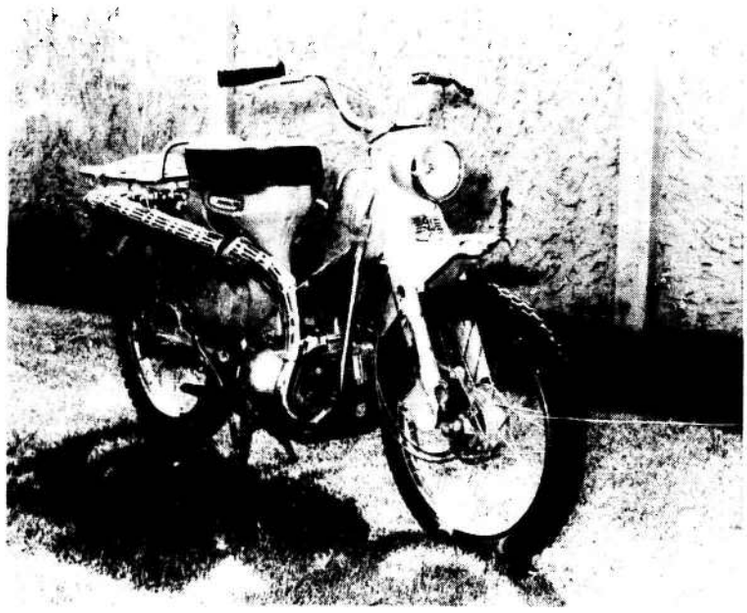

Fig. 1 Honda CT-90 Motorbike, Mountain Type

Fig. 2 Trailbreaker Motorcycle

advantage over traditional four-wheeled vehicles; in most cases the increased mobility and speed of movement provided by the motorbikes gives a platoon a decided advantage over foot patrols.

The major roadways in southern Thailand, paved or of laterite construction, connect only the larger towns and villages. Secondary roads are far apart and, generally, not more than five miles in length. (See Figure 3a). They are rough, often deeply-rutted, and, during the wet season, very soft and partially flooded. Roadway embankments and water ditches paralleling both major and secondary roads are difficult to negotiate and often require that travellers make lengthy detours to reach a crossing point

Plantation trails and footpaths also serve as principal avenues of movement and communication in this sector of southern Thailand. Most trails are five to six feet wide, are rough surfaced, and have overhanging vegetation that limits visibility (see Figure 3b). The same conditions exist with regard to the footpaths except for width; generally they are two to three feet wide. During the wet season the ability to move along these trails and footpaths ranges from difficult to impossible, as they are soft and rutted and at times covered by water; vegetation becomes very dense with a corresponding reduction in visibility. Some specific environment information is summarized in the paragraphs that follow.

Para Rubber Plantations

Para rubber plantations of varying size are scattered throughout the Sadao area. The surface geometry of these plantations varies from zero to five degrees. Most plantation areas have termite mounds from four to seven feet in height with a base diameter of from eight to 15 feet; they are generally spaced from 15 to 60 feet apart (see Figure 4). The plantation soil is generally clay to sandy clay, and vegetation and ground cover are uniform. Entire plantations are cultivated, but generally only about 40 percent of the area is completely free of undergrowth; the remaining 60 percent has undergrowth varying from light to dense growing in heights to six feet. The rubber trees are quite uniformly distributed; trees are spaced about twelve feet apart, and tree diameters range from three to 16 inches (see Figure 5). Visibility in some places is rather limited, and motorbike speeds are restricted to below 15 miles per hour.

Fig. 3 Trails and Roads in South Thailand

Fig. 4 Anthill in South Thailand

Fig. 5 Rubber Plantation

Topographic Low

The heavily forested or jungle areas present the greatest deterrent to motorbike transportation, and in some areas prevent any movement at all by motorbikes. The surface geometry varies from flat to about three degrees, generally with gently undulating surfaces, but criss-crossed with drainage channels and eroded areas. Both seen and concealed obstacles such as tree stumps, fallen trees, holes and soft spots slow up trafficability even during the dry season of February-May (see Figure 6). During the wet season there is flooding to varying depths, and some low places are under water for weeks at a time. Even at times when these heavily forested or jungle areas are passable, motorbike speeds will be limited to less than six or seven miles per hour.

Topographic High

In these areas, slow movement (i.e., less than 12 miles per hour) is relatively easy; rock surfaces, rillmarks and ruts can be avoided by short detours (see Figure 7). Vegetation is, for the most part, not a serious problem, as the large trees and stumps are widely spaced. Dense but low ground cover sometimes reduces motorbike movement. The surface geometry ranges from zero to as much as five degrees (see Figure 8); the terrain is mostly undulating, but there are occasional steep ravines that are impassable by motorbikes and nearly so for foot traffic. Flooding or standing water generally present no problem in these areas, even during the rainy seasons.

Hydrologic Components

Nearly all streams and natural drainage channels have steep banks, and in many cases the banks are high as well as steep. The entrances to and exits from these waterways are rarely opposing, and this factor many necessitate long detours for crossing. Water depths tend to be greater than motorbikes can successfully ford.

TEST PLAN

The test plan for the conduct of Stage II of the motorbike tests was developed by MRDC/ARPA and its associated research contractors.

Fig. 6 Jungle Area

Fig. 7 Topographic High Area

Fig. 8 Topographic High

The plan was approved by Air Vice Marshal Manob (then Commanding General, MRDC) and coordinated with USOM Public Safety Division and the United States Embassy.

The objectives, measures of effectiveness, and criteria of the test plan for the Stage II motorbike tests were stated as given below.

Objectives

1. Objective A, the overall objective of the operational evaluation (Stage II), is to obtain data to support an analysis to predict if increased effectiveness of the police function in rural security can be achieved by providing the police with motorcycles.

2. Objective B is to acquire comparative data on the frequency of contact, response time, degree of usage and logistic cost on test BPP units when operating with and without the availability of a pool of suitable motorcycles.

Measures of Effectiveness

1. The measure of effectiveness applied to Objective A will be:

   a. The degree to which increased area coverage can be achieved by police units patrolling rural villages with the same frequency that they are presently patrolled using current logistic support methods.

   b. Within the same area of responsibility, the degree to which increased frequency of contact is achieved using motorcycles rather than current transportation methods.

   c. Within existing coverage responsibilities, the number of villages, trails, etc., that are patrolled that were not patrolled previously.

2. The measures of effectiveness applied to Objective B are as follows:

   a. The difference in the time from call to arrival divided

by distance for patrols to respond to a call, between a motorcycle-equipped unit and a unit as currently equipped.

b. The difference in rate of village visitation (i.e., number of villages visited per patrol per day) between a motorcycle-equipped unit and a unit as currently equipped.

c. The difference in logistic support required to maintain the rates of measures 2a and 2b above between a motorcycle-equipped unit and a unit as currently equipped.

Criteria

Each criterion listed corresponds to the identically numbered and lettered item in Measure of Effectiveness listed above.

1. The criteria for each of the measures of effectiveness applied to Objective A are as listed below:

   a. The choice of motorcycles over existing transportation methods will be that the area coverage achieved will be significantly greater than that which would be achieved had the same expenditure been made for increasing the force size using existing transportation methods.

   b. The choice will be that motorcycles should be chosen if the frequency of coverage obtainable by the addition of motorcycles can be achieved for significantly less cost than if this same frequency were to be obtained by increasing force size and using existing transportation methods.

   c. The choice would be for equipping the police with motorcycles if the number of villages and trails visited per unit time was significantly greater than could be achieved at the same cost with existing transportation methods and the acquisition of additional personnel.

2. The criteria for each of the measures of effectiveness applied to Objective B are as follows:

a. The choice will be made for a motorcycle-equipped unit to enter into the evaluation of Objective A if, according to the measures stated in paragraphs 2a and 2b, Measures of Effectiveness, above, there is a significant improvement in the operations of the unit equipped with motorcycles in comparison to the unit operating with its current transportation capability in the same area.

b. The choice will be based on available evidence, in the opinion of the evaluation team, that logistic load imposed is not too great to obviate the choice under Objective A.

Test Plan Specifications

The plan of test for conducting the Stage II motorbike test, user evaluation, set forth the specifications listed in the following paragraphs.

The User Unit

The user unit will be the BPP company headquartered at Sadao. The unit consists of a company headquarters, two or more line platoons, and a platoon (10-30 men) in company reserve at headquarters. The motor pool located at the company headquarters consists of two trucks and one jeep. The motor pool has a limited maintenance capability; however, maintenance facilities do exist in the nearby town and villages.

The Test Vehicles

Based on the tentative conclusions of the Stage I tests, it is proposed that the vehicles for Stage II consist of five Trailbreaker motorcycles and twenty Honda CT-90 (mountain trail) motorbikes. It is anticipated that the Trailbreaker will be used primarily on those marginal tracks and foot-trails where motorbikes do not normally go and which are usually traversed on foot.

Employment of Vehicles

General. The motorbikes will be employed, for evaluation pur-

poses, in the same fashion as the four-wheeled vehicles currently used by the BPP: that is, they will be assigned to the user company to be used as needed. However, they will be available to Area IX BPP Headquarters on an on-call basis as required to support critical operations elsewhere in the area.

The man/vehicle and vehicle/vehicle (Trailbreaker/Honda or four-wheeled vehicle/motorcycles) mix will be varied as dictated by the type of patrol, terrain and weather conditions. Data gathering during the course of the evaluation will reflect the various mixes and provide a basis for determination of the range of typical mixes as related to the local conditions.

Specific. The motorbikes may be employed in any of the following kinds of operations:

1. Patrols by small teams
2. Patrols by a squad (8-10 men)
3. Relief of outpost (changing the guard)
4. Reinforcement of patrol or other police unit under attack
5. Rapid response to report of terrorist act in a village, appearance for investigation, pursuit under attack
6. Transport of supplies to outpost, deployed platoon post, etc.
7. Deployment of the mobile reserve platoon (MRP)
8. Evacuation of wounded or sick.

Evaluation

The operational evaluation will, in essence, be a six-month trial period during which the use of the test vehicles will be evaluated by both the evaluation staff and by the user in regular BPP operations. Several kinds of data are to be collected from several sources.

Sources. Patrol reports, after-action reports and vehicle and mission reports will be the primary sources of quantitative data. Debriefing of persons engaged in actions in which motorbikes played a significant part will also be accomplished. Questionnaires furnished by the data collection team will be filled out by all users during the evaluation period. Reports of earlier patrols and actions already on file will be used as the source of control data.

Data to be Collected. Data to be collected will include, but not be limited to, the following:

1. Length of patrol in time and distance; a form will be used to provide a mission report indicating time and distance of each mission conducted. This report also includes the type of terrain traversed and narrative description of the mission and the reason for conducting the mission.

2. Time elapsing between receipt of information operation order and departure of patrol

3. Number of men, weapons and other gear carried

4. Distance and elapsed time between leaving the motorbikes and engaging the enemy or accomplishing the assigned mission

5. Fuel consumption, maintenance actions in hours, use of repair parts, and downtime (to be collected for trucks and jeeps as well if such vehicles are used)

6. Bonus or detrimental effects accruing, if any, from the use of motorbikes.

Data Generated for Analysis. From the data collected, the following kinds of information will be obtained to satisfy the measures of effectiveness outlined earlier:

1. Number of patrols conducted, villages visited, kilometers patrolled per month

2. Distance covered per patrol or engagement/pursuit

3. Number of successful contacts per deployment

4. Number of unit manhours spent in maintenance per kilometer travelled

5. Amount of fuel consumed, amount of money spent for outside maintenance per kilometer travelled.

Conduct of the Test

Inherent to the conduct of the Stage II motorbike test is a direct comparison of the normal operations of the BPP platoon unaided by motorbikes with those of a platoon equipped with Trailbreaker and Honda CT-90 motorbikes. It was intended that the sources of information for use in making the comparison and analysis would come from records of past missions of the BPP platoon not equipped with motorbikes, current missions of one of the two platoons in the Sadao Company Headquarters in regular operations without motorbikes, and the 913th Platoon from Sadao conducting similar operations but aided by the use of motorbikes.

The following paragraphs describe the BPP operations without and with motorbikes.

Non-Motorbike Operations

The methods of patrolling in the Sadao area vary considerably owing to the different types of terrain and vegetation, the availability of personnel to conduct patrols, and the distribution within a given sector of the villages or settlements to be visited by the patrols. Records of past patrols are practically non-existent; however, with the few available records and from personal interviews with patrol members, the following description of patrol operations is provided.

General. Each patrol makes a daily radio report to the Company Headquarters in Sadao to indicate their approximate location and general condition. The radio report is a log entry that provides little information (it should be noted that the range of the radio carried by the patrols is restricted by terrain and vegetation). For security

reasons, patrol members are not allowed to keep any record of the patrol during the actual conduct of the mission. Upon return to Company Headquarters, the Patrol Leader makes a report to the Commander; however, this report is usually not complete owing to inability of the Patrol Leader to recall all of the events and occurences during the patrol. The number of personnel performing patrols will vary with the area of the patrol, the purpose of the patrol, and the availability of personnel.

Response Patrol. The Response Patrol will vary in size and firepower. If the mission is to check on CT sightings, it will probably be mounted in Jeeps and/or IH Truck, and, depending on the amount of time it will be in the field, will carry a minimum of supplies. If the Response Patrol is acting on specific information and is used as an ambush party, it will go directly to the ambush site and dig in. This kind of patrol is usually less than 24 hours in length.

Reconnaissance Patrol. A typical reconnaissance patrol mission is illustrated in Figure 9. The length of time of missions will vary, but 30 days is considered as an average patrol length. The patrol is given an area to cover by the Company Commander, as is the length of time the patrol should be in the field. The purpose of the mission illustrated in Figure 9 was twofold: first, to visit villages and settlements in the area; and second, to check trails and jungle tracks for signs of activity. A patrol moves out from Sadao early in the day into the patrol area, and at the end of the day a base camp is established. During the next three days the unit operates from the base camp; each day, a one-day patrol is conducted into the surrounding area. Some patrols require only one-half day. The purpose, in any case, is to visit those areas where there are or have been indications of CT activity. At the end of three days, the patrol moves the base camp to another location, and the procedure is repeated. The process is continued throughout the 30-day period; subsequent patrols may cover this same area, but the same route will not be followed.

Motorbike Operations

The method and technique of patrolling in the Sadao area changed considerably with the acquisition of the motorbikes by the 913th Pla-

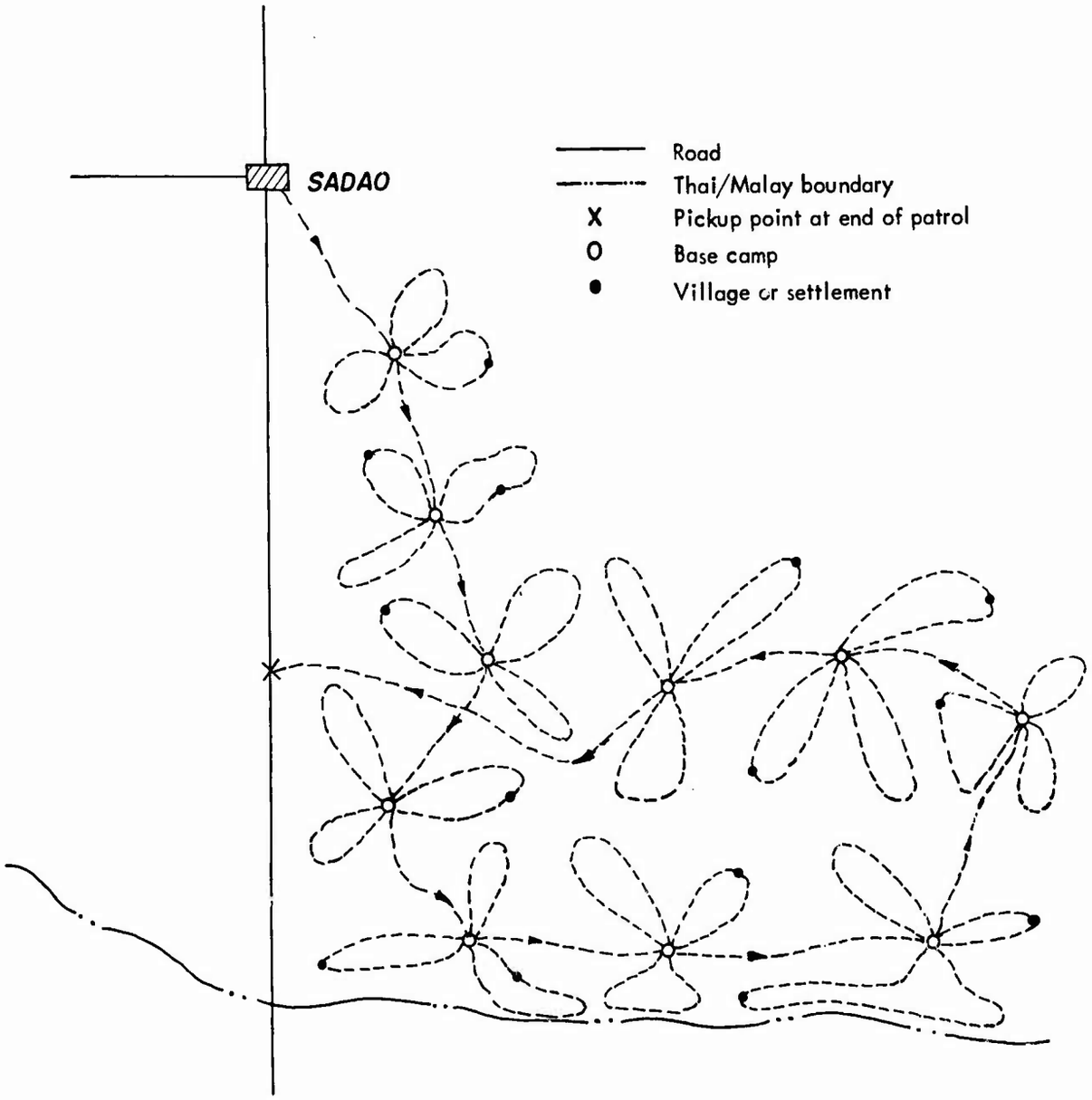

Fig. 9 Course of a Typical BPP 30-day Patrol

toon. There were a number of reasons for the change in modus operandi: first, two of the three platoons at the Sadao Headquarters were transferred from that post and not replaced; and second, the Commander decided that the 913th Platoon equipped with motorbikes would not need to make month-long or even overnight patrols. With the added mobility provided by the motorbikes, the Commander directed that each mission be completed and the patrol members return to headquarters each night.

The 913th Platoon, with the motorbikes, operated in the Sadao area from its Company Headquarters from 19 October 1967 through 18 February 1968, and again from 3 May through 31 July 1968. These were the motorbike test periods. In the interim (19 February through 2 May 1968), the platoon was assigned to the Betong area as a part of a large operation being conducted there by the Thai BPP and Malaysian police units.

During the user evaluation test period there were missions of one sort or another nearly every day of each week. However, the primary use of the motorbikes and the greatest number of patrols were one- or two-motorbike "information gathering" or "intelligence" patrols from headquarters to a given point and return (See Figure 10); these patrols generally were two to three hours in duration. In the months of November, December, and January there was a total of twenty-three patrols or actions that could be termed major missions; that is, from five to twenty motorbikes were used for each mission. Civic Action and reconnaissance patrols accounted for most of the mission during this period; transporting reserves, photographic coverage and ambushes were also cited as the purpose of some missions. It should be noted that the Trailbreaker motorcycles were almost never used on the missions conducted in the Sadao area.

Before the beginning of the test period, two types of data forms were developed by the MRDC/ARPA group. The first form, designed to record user evaluation data, was titled Motorbike Daily Trip Report, a copy of which was to be completed by each motorbike operator upon completion of a mission. The second form, titled Motorbike Maintenance Report, was to be completed daily on each motorbike jointly by the motorbike operator and the MRDC engineer/mechanic. The forms were modified somewhat during the training phase (October 1967) of the Stage II motorbike test to correct deficiencies noted during training. Owing to a paucity of data and some deficiencies noted in the Motorbike

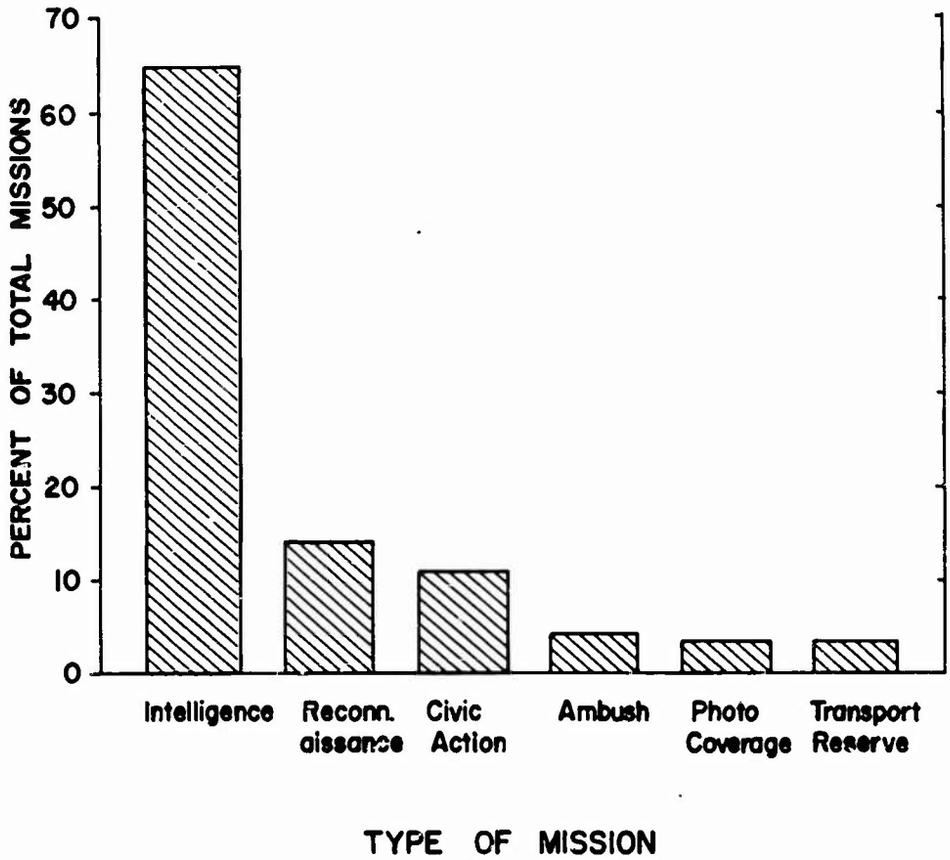

Fig. 10 Percent of Total Missions by Type of Mission

Daily Trip Report, a new questionnaire-type data form was developed in May for use during the final two months of the user evaluation. It was intended the form be used for debriefing two or more of the mission participants upon their return to Sadao headquarters. Unfortunately, the form was never used for the purpose intended.

It should be realized at this point that the Stage II motorbike test depended entirely on the coordination and cooperation that could be effected by the BPP and MRDC/ARPA personnel. The test unit, as such, was never intended to be subject to the control of the MRDC/ARPA staff members; data-gathering activities were dependent upon the regular BPP operational schedule.

USER EVALUATION

The user evaluation of the two types of motorbikes (the Trailbreaker and the Honda CT-90) during the Stage II Motorbike Test was to be accomplished by having the BPP unit record the information necessary for analysis on the data forms provided. The evaluation of the two types of motorbikes is described below, categorized by type of motorbike.

Trailbreaker

As noted earlier in this report, the Trailbreaker was seldom used during the Stage II test period; there are no data forms of record describing the use of the Trailbreaker on the BPP missions. Comments gleaned from some of the Trailbreaker operators during both the Stage I and II tests giving some indication or reasons for the none-use of this vehicle are:

1. Slow speed on surfaced roads makes it difficult to keep up with other vehicles

2. Large tires require added operator strength for maneuvering (steering)

3. Lack of suspension system subjects driver to vibration and severe jarring and causes discomfort and early fatigue

4. Saddle height makes it difficult for the operator to have both feet on the ground while seated

5. Noise level is much higher than that of other locally used vehicles, including the Honda CT-90.

It has been suggested by some of the people acquainted with the Trailbreaker that it might best be used in coordination with another vehicle--i.e., transported by a four-wheeled truck to a point where the terrain is impassable by other vehicles, including conventional motorbikes.

Honda CT-90

It was stated under Motorbike Operations that during the busiest three-month period there was a total of 23 missions that could be termed major missions. That is, several motorbikes were employed on each mission. The 23 missions provided a total of 15 data forms completed in sufficient detail to be useful in this evaluation. The responses to the questions posed on the data forms are tabulated in Tables 1 through 3.

A large majority of the users believed the motorbikes to have increased the BPP's effectiveness in all of the six topics listed in Table 1. Three of the topics (Mobility/Maneuverability Improved, Operational Area Increased, Communications Improved) received a 100 percent affirmative response; two topics (Number of Medical Missions Increased and Number of Villages Visited Increased) received an 87 percent vote of confidence; the final topic (Frequency of Operations Increased) received an affirmative response of 93 percent.

Table 2 does not have as high a unanimity of user opinion as did Table 1. Affirmative responses were 93 percent and 87 percent respectively for the topics Unit Tactical Problems Decreased and Individual Tactics Improved. The affirmative responses for the other four topics were: Logistics Decreased, 71 percent; Vulnerability Decreased, 47 percent; Safety Decreased, 58 percent; and Deployment Improved, 64 percent. The greater differences in the responses to the latter four topics is probably a result of some evaluators having had to make their judgement only on the basis of their personal experience (e.g., an operator having had a motorbike accident believes that Safety Decreased, while another operator not having experienced an accident believes there was no decrease in safety).

Table 1
TOPICS

Question or Subject	Responses		Total Responses
	Yes	No	
Mobility/Maneuverability Improved	15	0	15
Operational Area Increased	15	0	15
Frequency of Operations Increased	13	1	14
Number of Villages Visited Increased	13	2	15
Number of Medical Missions Increased	13	2	15
Communications Improved	15	0	15

Table 2
OPERATIONAL TOPICS

Question or Subject	Responses		Total Responses
	Yes	No	
Unit Tactical Problem Decreased	14	1	15
Individual Tactics Improved	13	2	15
Logistics Decreased	10	4	14
Vulnerability Decreased	7	8	15
Safety Decreased	7	5	12
Deployment Improved	9	5	14

Table 3
SOCIOLOGICAL TOPICS

Question or Subject	Responses		Total Responses
	Yes	No	
BPP Morale Increased	15	0	15
Villagers Faith in BPP Improved	14	0	14

There are only two topics in Table 3--BPP Morale Increased and Villagers Faith in BPP Increased. The affirmative responses to these questions were 100 percent. The reason most frequently given for the increase in morale was that the unit was able to return to its headquarters each night or immediately after a mission was completed.

There were several additional kinds of information recorded during the user evaluation test; owing, however, to the paucity of these data, a tabular presentation has not been attempted, but the topics are described briefly in the following paragraphs:

Motorbike Unit Deployment

There were twelve cases of information regarding the movement of the motorbikes in formation. In all but one case the evaluators indicated the movement was made in single-column formation; a double-column formation occurred only once. The evaluators also indicated that in eleven out of twelve cases deployment in approaching an objective was en masse from one direction; one case cited the approach deployment as being made by small groups but, again, all from one direction.

Motorbike Security

The evaluators indicated that on twelve BPP motorbike missions the column was provided with front and rear security (see Figures 11 and 12); there was not, however, a single instance of flank security being established (this may have been due to the narrowness of the pathways or other terrain obstacles, but the fact of no instances of flank security might indicate a lack of appreciation of the technique).

When parked at a mission site, users made plans for emergency take-off in one direction only. The unit apparently did not much fear for the safety of the parked motorbikes, since instances of parking without guards led parking with guards by six to four times (see Figure 13).

Communications

Each of the seven data forms containing information on the subject of

Fig. 11 BPP Motorbike Patrol - Forward Security

Fig. 12 BPP Motorbike Patrol - Rear Security

Fig. 13 Motorbikes Parked - Unguarded

communications indicated that both hand signals and radios were used by the motorbike operators with no particular difficulty.

Weapons and Equipment

In all but one of twelve cases, the motorbike operators believed their weapons and equipment to be "adequate" rather than "bulky or heavy". In one instance the M-1 rifle was cited as being awkward for a rider to carry while mounted on a motorbike. There were no suggestions given for changing the weapons or equipment carried by the BPP unit.

DISCUSSION

The test plan for the Stage II Motorbike Test was carefully drawn up, and a detailed methodology was developed for an analysis based on the data to be recorded during the conduct of the user evaluation by the BPP headquartered at Sadao. It was recognized before the test started, however, that a successful evaluation and analysis was dependent on the amounts, kinds and validity of the data recorded by the BPP user organization. It was further recognized that the data-gathering activities were to be dependent on the user unit's cooperation and its understanding of the test objectives.

It must also be realized that the primary mission of the BPP in Sadao is and was police work, including CT suppression, and not data-gathering for the motorbike evaluation test. The ARPA/MRDC test personnel could make suggestions and attempt to guide the unit, but they could not direct the user evaluation per se. As stated earlier in this report, in spite of the long duration of the test and the many miles of operation of the motorbikes, the paucity and unevenness of the data, and the apparent lack of validity of much of the data all prevented a statistical analysis of the numbers recorded. A review of the raw data and the subsequent summaries of those data, together with the results of discussions with the ARPA/MRDC personnel observing at least parts of the user evaluation test, does allow one to make the subjective observations and to draw the conclusions contained in the following paragraphs.

Although there were no data forms completed for one- and two-man information-gathering or intelligence missions, the Daily Log shows many more motorbike trips for this purpose than for any other type of

mission performed by the BPP during the user evaluation test. It will may be that this is the greatest service to be provided by the motorbikes attached to the BPP organization, since the equipment does allow members of the unit to make many rapid, inconspicious trips throughout it's area of responsibility to contact their informants.

The "presence value" of being able to mount as many as thirty armed patrolmen for road tours in the area of responsibility should not be underestimated (see Figure 14). A show of strength in the towns and villages passed through by the motorbike mounted road patrols enhances the BPP's status with the local population, and probably contributes to the villagers' faith in the ability of the police to respond quickly when they are needed (see Figure 15).

The motorbikes are probably less effective and valuable than foot patrols in performing reconnaissance missions. The noise created by the motorbikes serves as advance warning to anyone not wishing to encounter a BPP patrol. The speed of the motorbikes in transit and the necessity for the operator to pay considerable attention to the roadway prevent his seeing as much as a foot patrolman might when passing the same way; neither is the motorbike operator likely to speak with passersby while on a motorbike patrol.

A review of the terrain descriptions for southern Thailand indicates there are sizeable areas that are never accessible to motorbike mounted patrols, and that in some other areas passage is denied them during the considerable rainy season. In these areas and seasons, the motorbike is a less desirable mode of transport than foot traffic.

The availability of the motorbikes does improve the BPP capability to patrol much larger areas more frequently than they can with foot patrols.

The increase in the effectiveness of such motorbike patrols remains a moot point. The motorbikes probably ougth to be used to augment, but not supplant, normal foot patrol operations.

The operating costs for the Honda CT-90 motorbikes (for POL, spare parts and replacements) will be about one hundred baht per motorbike per month. This cost figure does not include depreciation, new tires or normal maintenance; nor does it account for the increase in replacement costs as the motorbikes age and become worn as a result of continued heavy use. All or a large part of the costs of motorbike opera-

Fig. 14 Motorbikes Parked in Town

Fig. 15 Motorbikes on Parade

tions may be recoverable as a result of savings from the payment of per diem to the individual members of a patrol when engaged in the conduct of normal thirty-day missions on foot.

During the conduct of the user evaluation test, considerable information was gained, and many ideas were generated by the MRDC/ARPA and BPP personnel assigned to the project on the subjects of motorbike unit organization, motorbike use doctrine, training procedures, and maintenance requirements and procedures. These ideas and information would require further development and coordination with U.S. Agencies and the BPP before publication. In the event of the BPP being equipped with a large number of motorbikes for operational use, the effort required to produce such publications would be warranted.

Appendix A
MOTORBIKE CHARACTERISTICS

The test vehicles selected for the Stage II Motorbike Test (user Evaluation) were twenty Honda CT-90 (mountain trail) motorbikes and five Trailbreaker motorcycles, all with mufflers (silencers), kick starters, single saddles, extended pack racks, and step-through frames. Detailed descriptions of the two test vehicles are given below.

Honda CT-90 (mountain type) (See Figures A-1 and A-2).

Engine - OHV, single-cylinder, air-cooled, 4-stroke, 86.7 cc, developing 7.5 hp at 7,000 rpm..

Dimensions - Overall height is 98 cm (38.6 inches); length 1.8 m (70.9 inches); width 65.5 cm (5.4 inches); weight 86 kg (189 lbs.); fuel tank capacity 6.5 liters (1.3 Imp. Gal.): fuel consumption rate, 82 Km/liter.

Tires - Cross-country, 2.75-17 with lug tread

Special features - Four-speed, constant mesh, return change transmission with wet, multiple-plate, automatic clutch for easy control; 6 v 11 AH battery, kick starter; upswept exhaust (to clear rocks, logs, etc.); and step-through frame for quick dismount (e.g., under fire).

Trailbreaker (See Figures A-3 and A-4).

The Trailbreaker is a low-tire-pressure motorcycle designed specifically for operations over rough terrain. The characteristics of the vehicle, as detailed by the manufacturer, Rokon Inc., Wilmington, Vermont, are given below.

Power Train - Front and rear wheels are driven through a system of bevel gears and a drive shaft. A universal joint is fitted to the front portion of the drive shaft to allow turning of the vehicle. An over-ride slip mechanism is built into the drive shaft to allow the front wheel to travel farther, or faster, than the rear wheel. A

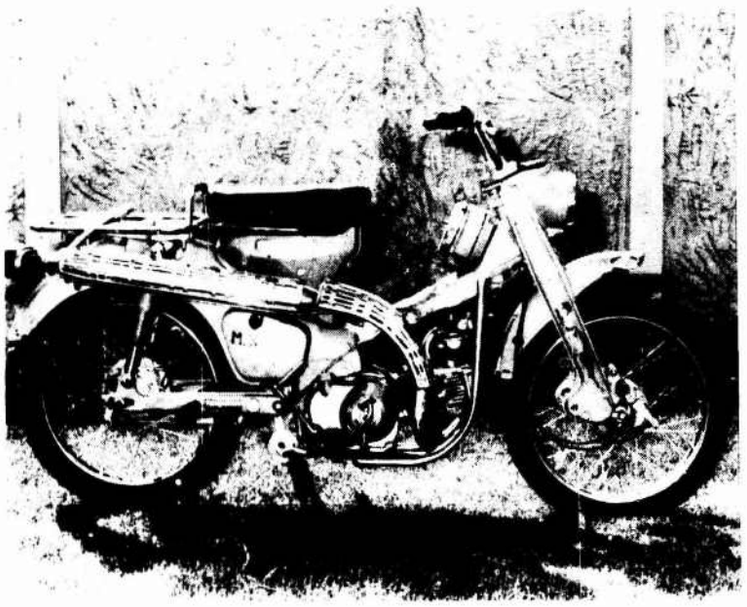

Fig. A-1 Honda CT-90

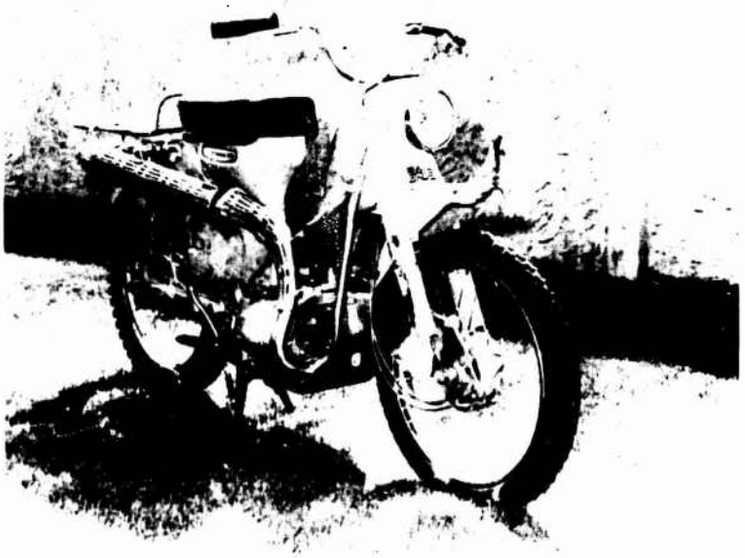

Fig. A-2 Honda CT-90

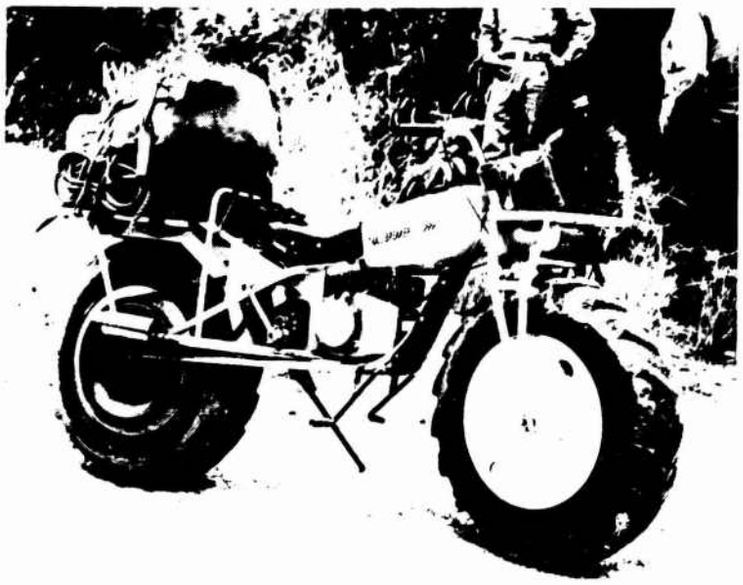

Fig. A-3 Trailbreaker with Trail Load

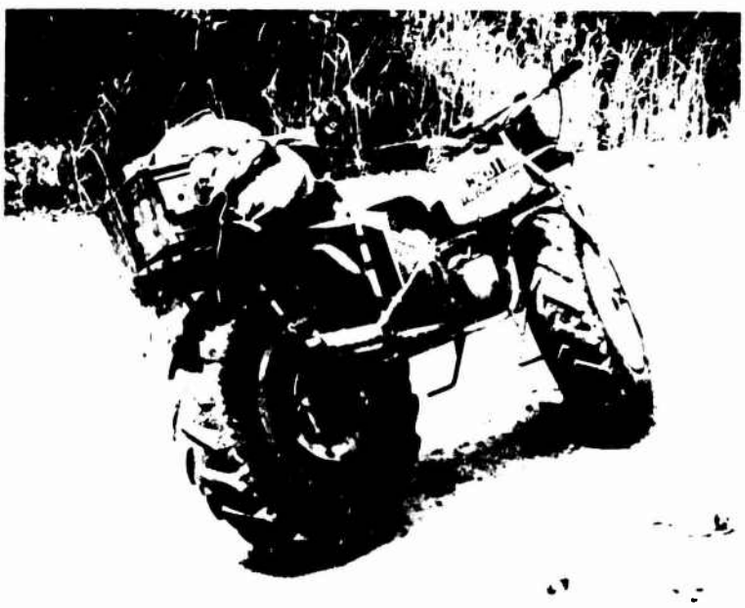

Fig. A-4 Trailbreaker with Trail Load

sprag mechanism permits kick starting through the transmission and fluid coupling.

Engine - The vehicle is equipped with a two-cycle, "West Bend" high-torque engine developing approximately eight horsepower. Standard equipment includes a dry-type air filter, an aircraft-type carburetor which permits the engine to operate in any position, water proofed magneto ignition, and a standard automotive-type spark plug.

Transmission and Drive System - The transmission is connected to the engine through a fluid drive coupling, thus eliminating the need for a clutch. Three power ranges are provided: 70 to 1 in low, 40 to 1 in second, and 24 to 1 in third. Maximum speed is approximately 20 miles per hour.

Tires - Implement type, 6.70 x15 - 2-ply, low-pressure. Recommended tire pressure is 5 p.s.i. The tires act as the spring suspension for the vehicle.

Fuel Capacity and Range - The fuel tank has a capacity of 2 gallons (US), permitting up to eight hours of operation without refueling (according to the manufacturer's specification).

Controls and Brakes - Throttle and brakes are operated from the handle bars. Both wheels have drum-type brakes.

Wheels - Heliarc welded aluminum forming a drum capable of carrying 4-1/2 gallons of fluid per wheel. When empty, wheels act as flotation tanks in water.

Dimensions and Weight - Length 77 inches, height 41 inches, wheelbase 47 inches, seat height 30 inches, ground clearance 14 inches, weight 182 pounds.

Appendix B
NOISE LEVEL TEST

A simple, small-scale test was conducted to determine, for both types of motorbike, the engine noise levels versus distance in the local terrain, and to check the difference in the noise levels created by the two types of motorbikes. Measurements were made aurally, and no instrumentation was used.

The test course chosen was relatively free of traffic: the terrain was flat with dense vegetation. Humidity was 100 percent. Tests were conducted when background noises resulting from weather conditions were minimal.

Noise recording personnel were stationed at the mid-point of the four-mile test course. The motorbikes, operating under normal load and at controlled (normal throttle) engine speeds, started from one end of the course and ran through the mid-point to the other end. The locations of the motorbikes at the time when they were first audible to the recording personnel as the bikes approached the mid-point were recorded, as were the locations at the time the noise became inaudible as the bikes moved away from the mid-point. Tests were run during conditions of no wind and during conditions of wind of approximately two miles per hour. Trailbreaker motorbikes were tested singly; Honda CT-90 bikes were tested in groups with a minimum size of three, since it was believed that this would be the minimum number of vehicles for any given BPP mission.

The most significant of the noise level test results shown in Table B-1 were:

1. A single Trailbreaker motorbike has a noise level signature greater than that of three Honda CT-90's operating as a unit

2. Even when operating against a two-mile-per-hour wind, the three-Honda unit has a noise signature that can be heard for about four tenths of a mile.

Table B-1
MOTORBIKE NOISE LEVELS

Number/Type of Motorbikes	Distance Noise is Detectable (miles)		
	No Wind	With the Wind*	Against the Wind*
3 Honda CT-90	0.6	1.0	0.4
5 Honda CT-90	1.0	1.3	0.6
8 Honda CT-90	1.4	1.6	1.1
1 Trailbreaker	0.9	1.1	0.8

* Wind velocity measured at 2 mph.

Appendix C
MAINTENANCE AND LOGISTICS

INTRODUCTION

The maintenance and logistic requirements generated during the Stage II Motorbike Test were ascertained and recorded by means of the data form titled Motorbike Maintenance Report. The forms were completed by the MRDC engineer/mechanics assigned to the project. This appendix provides summaries of the maintenance and logistics data generated during the user evaluation test period.

It was planned that all first- and second-echelon maintenance and repair be done by the individual motorbike operators, and that only third-echelon or major maintenance and repair be performed by the MRDC engineer/mechanics. In practice, however, nearly all motorbike maintenance and repair service was accomplished by the latter group. For this reason it is believed the maintenance was better than would normally be expected of a user unit.

The expected correlation between maintenance actions and mileage (Tables C-1 and C-2) for the months of March and April is not present as it is in the other months of the tables. The high incidence of maintenance versus low mileage in the month of March was due to reduced operations in Betong that month as preparations were made for a big operation in April. The converse was true in April; i.e., there was a low incidence of maintenance versus a high mileage rate because nearly all first- and second-echelon maintenance was performed in the field by the motorbike operators and was not recorded on the Motorbike Maintenance Report form.

The Appendix also discusses modifications suggested for para-military use of the Honda CT-90 motorbike.

BREAKDOWN AND REPAIR

As could be expected, motorbike breakdowns and the frequency of necessary repairs and maintenance actions were largely a function of the amount of use or the number of miles of motorbike operation. Also there were cases of repairs required as a result of either particularly hard driving or of carelessness on the part of the operator.

The normal maintenance called for in the Honda CT-90 Owners Manual is not included in the numbers given in Figure C-1; such maintenance, however, was performed at the times and/or mileages specified in the manual. Except for maintenance called for in the Owners Manual, each repair or maintenance action performed by the MRDC engineer/mechanic was counted as a separate case; the number of cases was summed up independently of the actual number of motorbikes operated during a given month.

PARTS REPLACEMENT AND COST

As a part of the overall record kept during the conduct of the Stage II Motorbike Test, a careful count of the spare parts purchased was maintained by the MRDC/ARPA personnel. All of the spare parts listed in Table C-1 were purchased retail from local area vendors and installed by the local mechanics at regular commercial rates.

The cost of spare parts in Table C-1 amounted to 5,316 baht, and the service charges at the local garages amounted to 5,550 baht, resulting in a total expenditure during the nine-month period of 10,866 baht. The average cost per month for spare parts and service for the twenty Honda CT-90 motorbikes was 1,208 baht ($60).

It should be noted that the service charges were directly associated with the cost of spare parts, i.e., installation charges. This amount did not include the cost of regular service maintenance or repair not involving new parts.

POL AND MILEAGE RECORDS

Fuel Consumption

The twenty Honda CT-90 motorbikes used a total of 1,578 liters of fuel during the user evaluation period. Figure C-2 gives the fuel consumption rate by month; the average consumption rate was about 266 liters per month. To make the numbers more meaningful, the months are included during which the motorbikes were assigned to the Betong area.

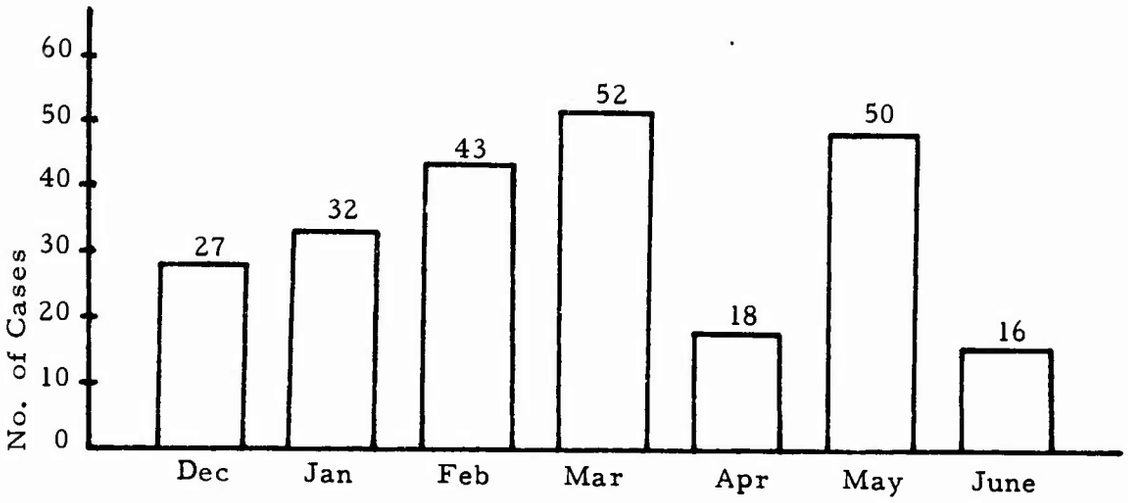

Fig. C-1 Cases of Repair and Maintenance for 20 Honda CT-90 Motorbikes

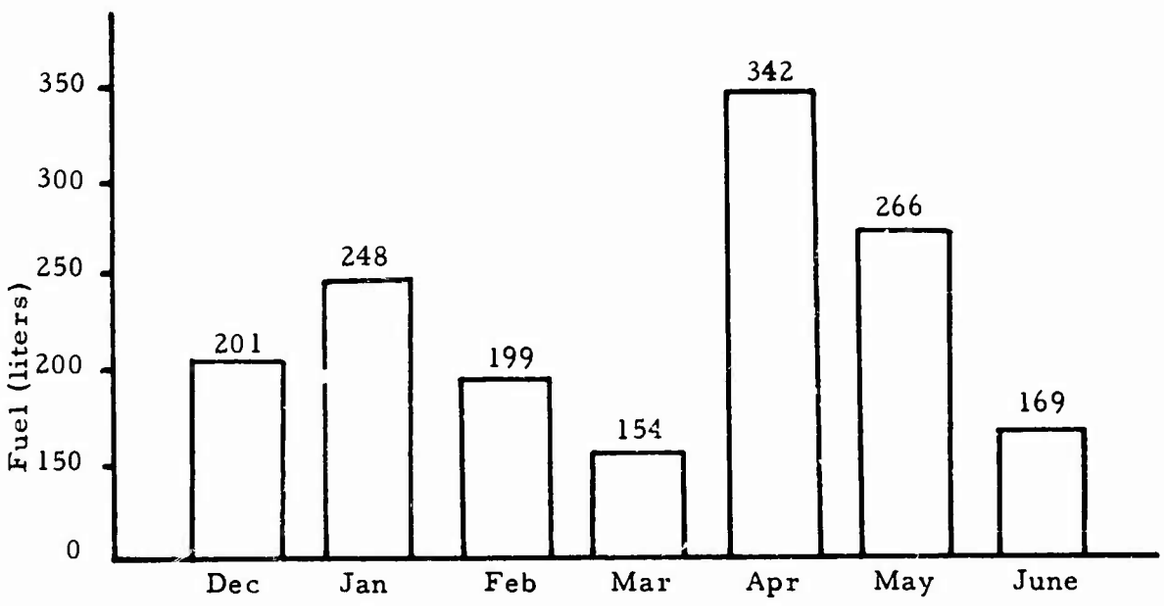

Fig. C-2 Monthly Fuel Consumption, 20 Honda CT-90 Motorbikes

Table C-1
PARTS AND REPLACEMENT COSTS, 20 HONDA CT-90
MOTORBIKES (10/8/67 to 7/3/68)

Item	No. of Parts	Baht (Cost)	Installation Charge* (Baht)
Spark plugs	48	336	-
Bolts & nuts	44	44	-
Brake plate	41	820	820
Brake handle	15	225	150
Clutch plate	12	120	600
Piston ring set	12	300	1,200
Speedometer lightbulb	10	20	100
Acid solution	10	60	100
Speedometer reading wire	8	120	80
Battery	6	630	60
Inside tire	6	150	120
Drive chain	6	450	180
Brake screw	5	15	-
Headlight bulb	5	40	50
Foot rest pedal	5	30	50
Fuse	5	5	-
Gasket plate	4	24	80
Drive chain link	4	10	200
Brake level wire	4	64	40
Rubber ring for valve	4	16	80
Rear light plastic cover	4	64	40
Distilled water	3	6	-
Cam chain	3	120	150
Cam chain guide sprocket	3	150	150
Selenium rectifier	3	270	150
Valve guide	2	12	100
Cam sprocket	2	80	100
Cam chain guide roller tensioner	2	40	100
Cylinder gasket	2	10	40
Rubber O-ring	2	10	100
Cam shaft	2	140	100
Contact breaker rubber seal	2	20	40
Headlight beam saddle	2	64	100
Front fork	2	560	240
Piston cylinder	1	45	100
Outside tire	1	150	20
Piston locker pin	1	9	40
Valve cover	1	8	20
Sound horn	1	50	10
Drive chain tension adj. nut	1	4	10
Handle cover	1	9	-
Valve spring	1	4	10
Rear light bulb	1	5	10
Rubber seal ring for gear box	1	7	10

* Cost of installation of spare parts only.

Table C-2
MILEAGES OF INDIVIDUAL HONDA CT-90 MOTORBIKES

Motorbike	Mileage						
	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
H-1	100	134	248	139	400	351	-
H-2	80	469	179	131	146	267	91
H-3	182	176	181	95	706	329	133
H-4	108	79	296	237	128	199	-
H-5	74	530	510	121	674	-	60
H-6	41	164	282	145	376	280	134
H-7	627	818	455	227	458	589	640
H-8	130	227	99	31	445	292	123
H-9	125	254	169	117	574	301	154
H-10	168	125	321	137	430	289	155
H-11	296	102	281	160	456	310	104
H-12	265	349	419	175	672	544	102
H-13	369	338	329	366	649	459	342
H-14	124	237	220	234	303	289	198
H-15	62	87	208	210	116	236	234
H-16	141	219	189	125	553	316	153
H-17	63	327	227	123	150	294	130
H-18	26	265	249	75	214	-	167
H-19	24	77	224	180	458	329	-
H-20	242	517	490	46	913	773	711

การดัดแปลงเพื่อใช้กับหน่วยกึ่งทหาร

การที่จะใช้รถ ฮอนด้า ซีที - 90 บนเส้นทางในป่าและภูมิประเทศนั้น ได้มีแนวความคิดที่จะดัดแปลงหลายอย่างด้วยกันเพื่อให้เหมาะสม และชิ้นอะไหล่ต่าง ๆ ของรถนี้ก็มีขายพร้อมอยู่ตามท้องตลาดทั่วประเทศไทย ในระหว่างดำเนินการทดสอบได้พบข้อบกพร่องบางประการจึงเห็นว่าถ้าจะพิจารณาจัดหารถจักรยานยนต์แบบนี้ไว้ใช้ราชการแล้ว ควรจะมีการปรับปรุงแก้ไขดังต่อไปนี้

ตัวปรับย่านอัตราความเร็ว สูง/ต่ำ

การเปลี่ยนย่านอัตราความเร็วจากสูงไปต่ำ หรือต่ำไปสูงนั้น รถจักรยานยนต์แบบนี้ต้องใช้กุญแจเลื่อนไปไขสลักเกลียวรูปหักเหลี่ยมให้เลื่อนไปมา ผู้ขับขี่ต้องลงจากรถ ซึ่งต้องใช้เวลาเป็นเหตุให้ผู้ขับขี่มักจะไม่ยอมเปลี่ยนย่านความเร็วให้เหมาะสม และขับขี่ไปทั้ง ๆ ที่ใช้ย่านอัตราความเร็วผิดทำให้รถชำรุดได้ง่าย จึงเสนอแนะว่าควรติดคานที่สลักเกลียวรูปหกเหลี่ยมซึ่งเป็นตัวปรับนี้ เพื่อให้ใช้เท้าเปลี่ยนย่านอัตราความเร็วได้ง่ายขึ้น

คันเปลี่ยนเกียร์ความเร็วเท้า, คันห้ามล้อเท้าและที่พักเท้า

คันเกียร์, คันห้ามล้อและที่พักเท้าเหล่านี้ชำรุด 24 ครั้ง เมื่อทดสอบต้องเชื่อม เพราะใช้ปฏิบัติการในภูมิประเทศโดยกระทบกับท่อนไม้ใหญ่และก้อนหินและสิ่งอื่น ๆ สรุปได้ว่าสิ่งเหล่านี้บอบบางเกินไป จึงขอเสนอแนะให้สร้างด้วยวัสดุที่แข็งแรงกว่านี้

สวิทช์ติดเครื่องยนต์และลูกกุญแจ

เมื่อรถจักรยานยนต์ล้มและแล่นชนกิ่งไม้ กุญแจปิดเปิดสวิทช์ติดเครื่องยนต์ชำรุด 8 ครั้ง ในการใช้รถจักรยานยนต์กับหน่วยกึ่งทหารพิจารณาเห็นว่ากุญแจเหล่านี้ไม่จำเป็นนัก จึงขอเสนอแนะให้ติดสวิทช์กุญแจแบบต่อตรงไว้ที่คันบังคับเลี้ยวแทน

Mileage

The number of miles traveled by the twenty Honda CT-90 motorbikes during the user evaluation period varied considerably from month to month. Figure C-3 shows the total mileage traveled by all the motorbikes each month. The motorbikes traveled a total of 36,290 miles during the six-month period, averaging about 5,200 miles per month.

The mileages recorded by each Honda motorbike, numbered H-1 through H-20, during each of the seven months are given in Table C-2 following. To make the numbers more meaningful the months are included during which the motorbikes were assigned to the Betong area.

MODIFICATIONS FOR PARAMILITARY USE

There are many features of the Honda CT-90 Motorbike which make it ideal for use on trails and cross-country operations, and spare parts are generally readily available throughout Thailand. Nevertheless, during the test period some shortcomings were revealed, and if a quantity purchase of these bikes was considered, then the following modifications or improvements should be incorporated.

Change lever for high/low speed range: The present method of changing the speed range requires the rider to dismount and shift the hexagonal selector with a spanner. This takes a little time, and a result the rider often does not use this facility and operates with the incorrect speed range. It is suggested that a small lever bar be fixed to the hexagonal selector to permit foot operation.

Gear Change pedal, rear brake pedal and pillion step: There were twenty-four cases of breakage of these item (requiring welding). In trail and cross-country travel they are vulnerable to impact with logs, rocks, etc., and the material appears too weak. It is recommended they be constructed of a stronger material.

Ignition switch and key: On eight occasions the on/off key which also controls the ignition was broken when the motorbike fell over or brushed against branches. For para-military use a key is not desirable, and it is recommended it be replaced by a direct contact switch probably located on the handle bar.

การปรับห้ามล้อหน้าและห้ามล้อหลัง

ที่ปรับห้ามล้อคลายตัวได้รวดเร็ว เป็นเหตุให้ห้ามล้อเสียประสิทธิภาพ ขอเสนอแนะให้ออกแบบใหม่ให้ดีกว่าเก่า

ไฟท้าย

ไฟท้ายสว่างมากเกินไป และมีขนาดใหญ่ทำให้ชำรุดง่าย จึงเสนอแนะให้เปลี่ยนเป็นขนาดเล็ก และมีที่พรางแสงด้วยเพื่อจะใช้รถจักรยานยนต์เข้าแล่นเป็นขบวนได้

แบตเตอรี่

เมื่อรถจักรยานยนต์ล้ม น้ำกรดไหลออก ควรพิจารณาหาทางปรับปรุงแบตเตอรี่

ฝาครอบหน้าทองขาว

เสนอแนะให้หาวิธีป้องกันน้ำเข้าไปเปียกหน้าทองขาว

หัวเทียน

หัวเทียนชำรุดเร็ว เนื่องจากในท้องถิ่นที่ทดสอบไม่มีหัวเทียนแบบมาตรฐานที่ติดมากับรถ จึงเลือกซื้อหัวเทียนที่ดีที่สุดซึ่งหาได้ในท้องตลาดแทน หัวเทียนชื้นง่ายและเขี้ยวสกปรกแม้จะทำความสะอาดแล้วก็ยังใช้ติดเครื่องไม่ได้ ต้องใช้วิธีเปลี่ยนหัวเทียนใหม่ ควรจะเลือกใช้หัวเทียนแบบกันน้ำได้ และถ้าจำเป็นจริง ๆ ควรจะมีการสะสมหัวเทียนแบบมาตรฐานไว้ในคลังของหน่วยใช้ด้วยเพื่อเป็นอะไหล่

เข็มชี้ตำแหน่งเกียร์ความเร็ว

เข็มชี้ตำแหน่งเกียร์ความเร็วนี้ จะแสดงให้ทราบว่าขณะที่ใช้รถนั้นเกียร์อยู่ในตำแหน่งเกียร์อะไร จะมีประโยชน์แก่ผู้ขับขี่มากเพราะทราบตำแหน่งเกียร์ที่ถูกต้อง ควรพิจารณาติดตั้งเพิ่มเพราะรถแบบนี้ยังไม่มี

Front and rear brake adjustment: The adjustment devices soon become loose with resultant loss of brake efficiency. It is recommended the design be improved.

Trail stop light: The light is too bright and is vulnerable to damage because of its size. It is recommended it be replaced with a smaller, compact light properly shielded for convoy work.

Battery: When the bikes fell over, electrolyte was lost. An improved type of battery should be considered.

Breaker point cover: An improved standard of waterproofing is recommended.

Spark plugs: Early failure of the spark plugs occurred. The standard plugs supplied with the bikes were not available locally, and so the best available local plugs were used The plug is easily wet and the electrode becomes dirty. Even after the plugs had been cleaned, the bikes would not start, and hence the plug had to be changed. A more appropriate waterproofed plug should be selected; if necessary, stocks would have to be held by the unit.

Gear indicator: An indicator to show what gear the bike was engaged in would be useful. It was difficult for riders to be sure at all times that they were in the correct gear.

Tires: The special traction tires were not available locally and had to be specially imported. A quantity of spares would need to be purchased with the bikes.

Paint: The motorbikes should be painted a flat olive drab or black colour and all metal parts given a dull finish to facilitate concealment.

Rider guard: A guard such as that shown in Figure C-4 should be fitted to a percentage of motorbikes. The purpose of the guard is to protect the rider by cutting any wire or rope stretched across a trail by the enemy.

ยาง

ยางแบบที่ติดมากับรถซึ่งออกแบบดอกยางพิเศษโดยเฉพาะยังไม่มีขายในท้องตลาดควรสั่งเข้ามาพร้อมกับรถเพื่อใช้เป็นยางอะไหล่ด้วย

สี

สีรถควรใช้สีกากีแกมเขียวหรือสีดำ ส่วนที่เป็นโลหะมีเงาควรทำให้ด้าน

เครื่องป้องกันผู้ขับขี่

เครื่องป้องกันผู้ขับขี่ตามที่แสดงไว้ในภาพ ซี - 4 ควรพิจารณาติดตั้งบนรถจักรยานยนต์จำนวนหนึ่ง ความมุ่งหมายของเครื่องป้องกันนี้เพื่อป้องกันผู้ขับขี่โดยตัดลวดหรือเชือกที่ข้าศึกขึงกั้นไว้บนเส้นทาง.

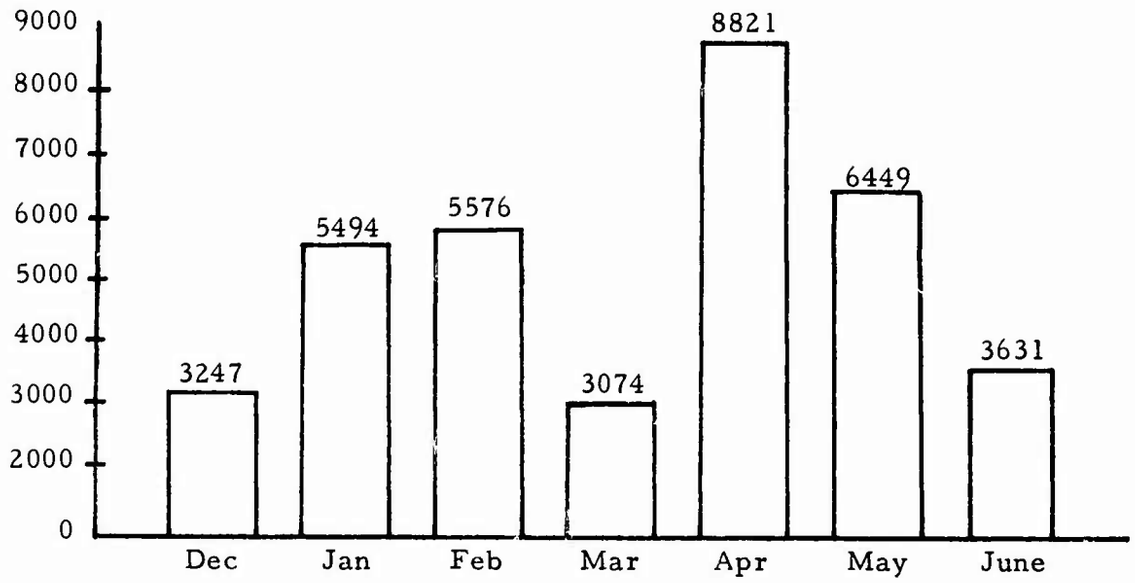

Fig. C-3 Monthly Mileage Totals, 20 Honda CT-90 Motorbikes

Fig. C-4 Wirecutter Ambush Guard on Honda CT-90

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13. ABSTRACT

A six-month evaluation was conducted using U.S. Trailbreaker motorcycles and Honda CT-90 Motorcycles to determine if the effectiveness of the police role in rural security can be increased by equipping the police units with motorbikes.

A designated Border Patrol Police platoon in South Thailand was supplied with twenty Honda and five Trailbreaker motorcycles for user evaluation tests.

It was found that equipping a small percentage of the police with motorbikes results in an increase in effectiveness in both tactical operation and administration. Too large a percentage of motorbikes in a unit quickly leads to degradation of the unit's performance because of terrain limitations, maintenance problems, noise signatures, and reluctance of motorbike riders to go out on overnight patrols.

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14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Motorcycle						
Motorbike						
Mobility						
Trail and off-road mobility						
BPP patrol						
Mountain type Motorbike						
Motorbike tests						